

# Determinants of Primary Care Specialty Choice: A Non-statistical Meta-analysis of the Literature

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## ABSTRACT

This paper analyzes and synthesizes the literature on primary care specialty choice from 1987 through 1993. To improve the validity and usefulness of the conclusions drawn from the literature, the authors developed a model of medical student specialty choice to guide the synthesis, and used only high-quality research (a final total of 73 articles). They found that students predominantly enter medical school with a preference for primary care careers, but that this preference diminishes over time (particularly over the clinical clerkship years). Student characteristics associated with primary care career choice are: being female, older, and married; having a broad undergraduate background; having non-physician parents; having relatively low income expectations; being interested in diverse patients and health problems; and having less interest in prestige, high technology, and surgery. Other traits, such as value orientation, personality, or life situation, yet to be reliably measured, may actually be responsible for some of these associations. Two curricular experiences are associated with increases in the numbers of students choosing primary care: required family practice clerkships and longitudinal primary care experiences. Overall, the number of required weeks in family practice shows the strongest association. Students are influenced by the cultures of the institutions in which they train, and an important factor in this influence is the

relative representation of academically credible, full-time primary care faculty within each institution's governance and everyday operation. In turn, the institutional culture and faculty composition are largely determined by each school's mission and funding sources—explaining, perhaps, the strong and consistent association frequently found between public schools and a greater output of primary care physicians.

Factors that do not influence primary care specialty choice include early exposure to family practice faculty or to family practitioners in their own clinics, having a high family medicine faculty-to-student ratio, and student debt level, unless exceptionally high. Also, students view a lack of understanding of the specialties as a major impediment to their career decisions, and it appears they acquire distorted images of the primary care specialties as they learn within major academic settings.

Strikingly few schools produce a majority of primary care graduates who enter family practice, general internal medicine, or general practice residencies or who actually practice as generalists. Even specially designed tracks seldom produce more than 60% primary care graduates. Twelve recommendations for strategies to increase the proportion of primary care physicians are provided.

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What determines primary care specialty choice? This question is not new. How-

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ever, it is becoming increasingly important with the growing consensus in the

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For another critical assessment of the literature on choice of generalist careers, see page 611; and for a related article on methodology, see page 642.

United States that the number of primary care physicians is inadequate to address the country's health care needs.<sup>1–3</sup> Yet, despite numerous calls for a redirection of medical education and despite genuine attempts by many medical schools to produce more generalists, most graduates choose subspecialty careers. Some suggest that the high cost of training in ambulatory care, federal

funding directed toward biomedical research, and an academic reward system that favors intensive research over clinical and teaching activities are barriers that inhibit medical schools from implementing the major changes necessary to affect specialty mix.<sup>4,5</sup> In addition, a lack of consensus as to which factors will influence specialty choice makes it difficult for educators to react responsibly to the mandates.

Unfortunately, the research literature on primary care specialty choice has provided little guidance. It is difficult to interpret due to multiple biases, design weaknesses, small numbers of subjects, inconsistencies in both dependent and independent variables, and conflicting results. We addressed this difficulty by first screening the literature in this area to identify studies of sufficient validity to yield "trustworthy" results. We then conducted a thorough and systematic review and analysis of the resulting literature in order to describe the current state of knowledge in this area and provide direction for policy development.

The literature synthesis was conducted to address the following research questions:

1. What factors have been hypothesized and studied as factors that may predict or influence the specialty choices of graduating medical students, particularly in relation to primary care careers?

2. What are the relationships between these factors, and how do they exert their influences on medical-student career decision making?

3. Based on evidence obtained from the best medical education research available, what can medical schools and policymakers do to increase the numbers of students choosing primary care careers?

## METHOD

A literature search was conducted to access MEDLINE, PsychInfo, Sociology Abstracts, Educational Resource Information Center (ERIC), and Disserta-

tion Abstracts. A total of 85 search terms were entered and cross-referenced, forming 218 commands, to find relevant studies. Additional search terms were discovered through review of the citations when appropriate. The first search, done on MEDLINE, included all references from 1966 through 1993, yielding over 1,400 citations. The search was then repeated with the other databases, though limited to between 1930 and 1993, yielding 455 citations from PsychInfo, 343 from Sociology Abstracts, 497 from ERIC, and 158 from Dissertation Abstracts.

Citation information (author, title, source, abstract) was reviewed for relevancy to the project. An article, book, or report was considered relevant if it pertained directly or indirectly to primary care specialty choice in the United States and Canada and was published between 1980 and 1993. (A few studies included osteopathic as well as allopathic schools.) Only original research and reviews were included, excluding editorials and essays. Studies pertaining to specific specialties that are non-primary care, such as psychiatry and anesthesiology, were also excluded, as were studies of medical students from countries other than the United States and Canada. As a result of using these exclusion criteria, and removing duplicates, 227 references were retrieved from the search on MEDLINE, 25 from ERIC, 19 from PsychInfo, and seven from Sociology Abstracts. No dissertation was found whose results were directly relevant to this project and not already present in the published literature. Finally, review articles were read separately and, with recently published annotated bibliographies, served as an additional source for studies not found during the on-line search.

Full documents for the resulting 307 references were reviewed, and those found to be irrelevant to primary care specialty choice were discarded. Others that related to components of our model (described below) but not specifically to specialty choice and articles

published before 1987 were set aside to fill gaps in the more recent literature. The final list of core studies to be summarized numbered 108 and was drawn from the years 1987 through 1993. A few exceptions were highly relevant 1994 unpublished studies being conducted simultaneously with this project.

Each of the core articles was rated and given a score from 0 to 100 by one of the first two investigators (CJB, LNM), using the validity scale developed by the authors and described below. A random sample of 20 articles was also scored by the third investigator (GM), an epidemiologist, to improve interrater reliability, which approached 100% after modification of the rating guidelines. The distribution of the study scores presented 45 points as a natural cutoff above which articles would be included in the synthesis. The 73 articles thus judged to be of high quality were then carefully reread and annotated in a standardized format to aid in synthesizing the literature.

## Instruments Used

The quality of a literature synthesis is a function of the quality of the studies that are included. In turn, the level of quality or validity of an explanatory research study is a function of how well the study controls for or assesses the plausibility of explanations for findings beyond those hypothesized by the researcher. In order to include only those studies with the most valid conclusions in this synthesis, a validity-scale instrument was created with which to rate the quality of studies retrieved on primary care career selection. The scale was based in part on work by Campbell and Stanley<sup>6</sup> and Cook and Campbell,<sup>7</sup> who clearly delineate the number of threats to internal validity that are minimized by each type of research design. Thus, each research design can be given a score that reflects how likely it is to yield results that are attributable to the variables hypothesized by the researcher. As the present study was most

concerned with understanding the causes of primary care specialty selection, internal validity was the primary concern. Thus, the greatest weight was given for the study design. Consideration was also given to external validity (sample size and response rate), statistical validity (were measures reliable and valid), and construct validity (was any theory guiding the study). Thus, those references that used study designs that controlled for many of the threats to internal validity, used reliable measures, had some theory guiding the work, and had larger samples and higher response rates received higher quality ratings than did studies not having these features. (A detailed description of the instrument and methods used can be found in the authors' methodology article on page 642 of this issue.)

#### Model for Determinants of Specialty Choice

To guide the review, a model for medical-student specialty choice was developed (see Figure 1). The model begins with the basic premise that specialty selection is based on each student's trying to match the *characteristics of a specialty*, as he or she perceives them, with his or her *career needs*, including personal needs, societal needs, and the need to meet the expectations of others. The career needs that each student tries to match with a chosen specialty will be determined by those things that he or she values, which in turn are determined by a combination of pre-medical-school life experiences, demographic characteristics, and personality, then shaped by the medical school experiences and by the values and culture of the institution(s) in which he or she receives medical training.

Each organization develops a culture that significantly influences the behavior, values, productivity, and satisfaction of its members. The power of an organization's culture to shape these aspects of its members is discussed in numerous bodies of research, such as writings on "excellent" corporations,<sup>8</sup> the character-

istics of productive academic organizations,<sup>9,10</sup> and the socialization of professionals.<sup>11,12</sup> The primary forces that form the culture of an academic organization are its mission, its faculty, and its students. The model in Figure 1 suggests that these features of a medical school greatly influence the specialty distribution of the graduates. Starting on the left of the model, the foundational determinant of specialty choice is school type. The type of school influences the mission, which in turn influences the faculty composition, including the presence of primary care faculty, the number of full-time versus part-time faculty, the number of academic versus clinical faculty, and so on. The faculty composition influences several critical components: student composition, and thus incoming student values; curriculum and institutional culture, which affect students' evolving values; and finally, the perceptions of the specialties students form and use when they select specialties.

In sum, this model presents a theory of how multiple variables work together to determine specialty choice. To begin to assess the accuracy of this theory and to determine the availability of information to assess each component, the highly rated literature is summarized as it relates to the model. Throughout the following discussion of the literature, results are reported using the outcome measures used by the authors (e.g., proportions of family practice, primary care, or generalist graduates). *Primary care* is used as the term to designate the outcome when we summarized results across studies using different outcome measures.

## RESULTS

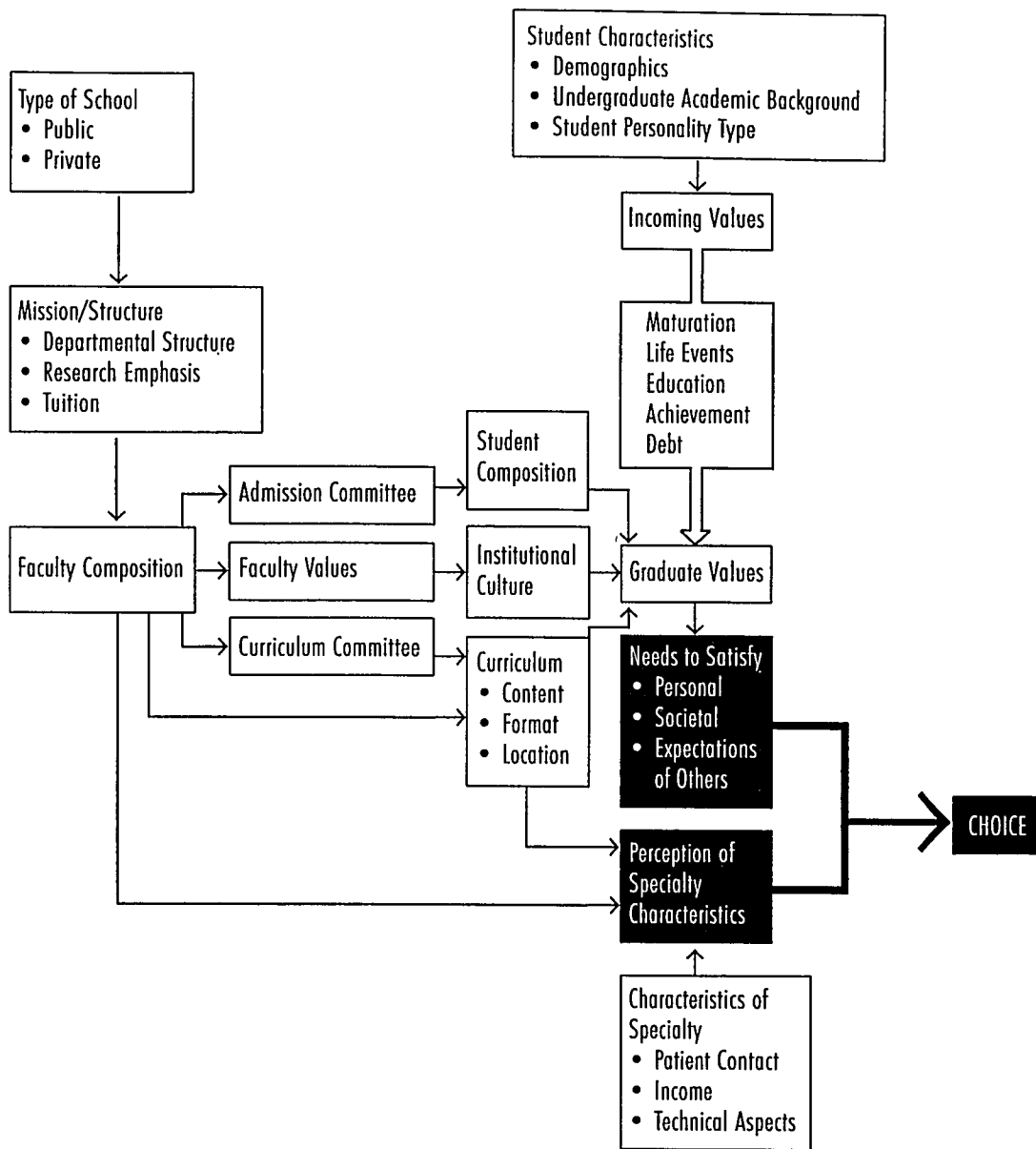
### State of the Literature

The studies examined were published quite evenly between 1987 and 1993, and included 100 journal articles, six unpublished studies (mostly government documents), and two monographs. A detailed summary of the data

on which the following description is based (including frequencies of types of research questions, study designs, data sources, etc.), and a full annotated bibliography are reported elsewhere.<sup>13</sup>

The profile of the research questions in the area of primary care specialty choice reveals a preponderance of articles on incoming student characteristics and curricula, with very few studies investigating the other important components of specialty choice: school characteristics, faculty composition, admission policies, and specialty characteristics. It also reveals a need to develop valid ways for studying possible influences such as those of mentors, role models, and students' career needs. The literature is seldom guided by any theory or model, and often lacks even a clearly stated hypothesis. The study design used most frequently is a cross-sectional survey method, with only four studies using experimental designs. An intermediate number used cohort or case-control designs. Most studies used data gathered via the Medical College Admission Test (MCAT) pre-medical-school questionnaire or the Association of American Medical College's (AAMC's) Medical School Graduation Questionnaire (GQ). The next most common data source was retrospective questionnaires, which obtained introspective causal self-reports. These instruments generally asked graduating medical students or physicians their reasons for choosing their specialties. Pathman and Agnew<sup>14</sup> present a detailed review of the threats to validity that this type of data source contains. This, combined with small sample sizes and cross-sectional designs, gave most of these studies low validity scores and caused them to be rejected from the synthesis.

Finally, the outcomes of the studies varies widely in the specialty-choice literature. Most studies have used residency choice as the outcome but used one of many definitions of primary care. In addition, interpretation is made even more difficult because several studies



**Figure 1.** Theoretical model of the variables that determine medical students' choices of specialties. To examine the accuracy of the model and to ascertain the availability of information to assess each component, the authors critically reviewed the literature on primary care specialty choice published from 1987 through 1993. (Note: this figure also appears in the related article on methodology, page 646.)

have found differences between a student's *preference*, or selection if there were no barriers (such as geographic or financial); a student's *choice*, the specialty he or she would choose now considering preference and barriers; and a student's *career attainment*, the actual specialty the student finally practices. When students are asked for their preferred specialty or in what specialty

they are most interested, it is unclear whether they are reporting a preference or a choice.

In general, the specialty choice literature is far from easy to interpret. Despite the shortcomings, however, helpful information can be gleaned by synthesizing only the studies most likely to produce valid results and by using a model to guide the synthesis.

### Determinants and Influences of Specialty Choice

#### *School Type, Mission, and Structure*

Six studies published since 1987 on primary care specialty selection specifically looked at the influence of this component of the model.<sup>15-20</sup> Five studies in-

volved U.S. schools, and collectively they looked at the relationship of proportion of primary care or family practice students produced to school characteristics: ownership (public versus private); age; location (rural versus metropolitan); amounts of funding from external research sources; Medicare educational sources; commitment to primary care education; class size; weeks of required family practice clinical training; total annual tuition and fees per student; state support per graduating student; federal research support per graduating student; number of full-time family medicine faculty per graduating student; proportion of full-time faculty who were family medicine faculty; mission; admission policies and student demographics; and faculty organizational structure.

All but one of the five studies<sup>17</sup> used multiple regression to assess the influence of a subset of these school characteristics on proportion of primary care or family practice students produced. Whitcomb et al.<sup>17</sup> assigned medical schools into quartiles based on their percentages of primary care graduates and then compared the low producers (25 schools with 22–29% primary care graduates) with high producers (25 schools, 39–56%) on the basis of school characteristics.

All of these studies consistently found that public schools, compared with private schools, produce significantly greater proportions of primary care graduates. For example, in the Whitcomb et al.<sup>17</sup> study, the low-producer group consisted mainly of private schools with class sizes of more than 100, located in the Northeast. In contrast, the high producers were mainly public schools with class sizes of fewer than 100. Eighteen of the low-producer schools, but only four of the high producers, were research-intensive. The average annual National Institutes of Health (NIH) funding in millions of dollars for the low producers was 20.3, whereas the average for the high pro-

ducers was 7.4. Similar trends were found for Direct Medical Education (DME) dollars. All high-producer schools had departments of family medicine, the majority of which were affiliated with three or more family residency sites and had a sponsored Area Health Education Center (AHEC). In comparison, only nine of the low-producer schools had family medicine departments. Twelve of the low producers had no affiliation with a family medicine residency site, and only two had an AHEC. Whitcomb et al. point out that there are several schools that have the characteristics of a low producer but actually produce large proportions of primary care graduates. A department of family practice was consistently found in each of these schools, and most were affiliated with three or more family residency sites and had a sponsored AHEC. Whitcomb et al. conclude that having a research emphasis is not inconsistent with producing primary care doctors, but that it is important to have a strong commitment to primary care.

The four studies that used multiple regression to assess the relationships of school variables to primary care or family practice output all found results similar to those of Whitcomb et al. For example, Campos-Outcalt and Senf<sup>18</sup> looked at the relationships between the proportion of graduates choosing family practice residencies and nine school variables: ownership of school, weeks of required family practice clinical training, age of school, total annual tuition and fees per student, state support per graduating student, federal research support per graduating student, difference between federal research support and state support per graduating student, number of full-time family medicine faculty per graduating student, and proportion of full-time faculty who were family medicine faculty. Seven of these variables were identified by univariate correlations as being associated with the proportion of family practice graduates produced. These seven were in-

cluded in a multiple regression, and only three entered the final equation: proportion of family practice faculty, ownership, and weeks of family practice required in the curriculum. Campos-Outcalt and Senf found that proportion of family medicine faculty is a better predictor than number of family medicine faculty per student. Again, as in the previous study, these authors note that several schools that produced significant proportions of primary care graduates did not have the expected characteristics. One of the possible predictors that this study did not include was amount of Title VII funds, since these were awarded to schools for the purpose of increasing the output of family doctors. Rosenblatt et al.<sup>16</sup> did include this variable and found no significant relationship.

Ferrier and Woodward<sup>20</sup> compared the proportions of graduates of the McMaster University School of Medicine who went into various specialties, particularly family practice, with the proportions of other medical schools in Canada. McMaster University differs from other Canadian schools in the profile of students accepted, the extensive use of the problem-based teaching method, and a three-year length of training, which most likely also reflects differences in mission and faculty composition. McMaster graduates are significantly more likely than graduates of other medical schools to be certified only in family medicine. In addition, researchers in the United Kingdom have been perplexed because, in spite of having similar curricula, different medical schools produce very different proportions of primary care graduates.<sup>21</sup> The above-mentioned studies suggest that differences in mission and faculty composition affect the proportion of graduates choosing primary care careers.

So, what do we make of these findings? Certainly there is a strong and consistent association between school ownership and primary care production. Further, when combined in analyses

with other variables hypothesized to influence specialty choice (for example, a required family practice clerkship), the variable that emerges as the most explanatory is whether a school is public or private. If this association is also a causal one, how could it be causing these observed differences in the proportions of students selecting primary care? Some students may be taking into account their impressions of a school's orientation when applying to medical school. Maheux and Beland,<sup>22</sup> for instance, found in their studies of three schools in Michigan that even first-year medical students reported significantly different orientations of their schools on such things as scientific values and humanistic values. These perceptions matched the different traditions and curriculum emphases of the schools. Thus, students may be generally aware of differences in schools' missions and orientations. However, their ability to use this knowledge is significantly limited by such things as where they are accepted and what the differences in tuition costs are.

In contrast, we do know that faculty systematically choose schools in which to work based on such things as mission, structure, research emphasis, and location. Thus, it is likely that school characteristics greatly affect the composition of faculty, who then, in turn, influence many other components depicted in our model.

For example, institutions that have research as a major mission and are substantially dependent on research and clinical dollars must attract, and are attractive to, faculty members who can produce income through research grants or clinical services. Further, research-productive faculty members are highly socialized to the values of research—as much as or more so than to the values of teaching or service.<sup>12,23</sup> Thus, research-oriented institutions have faculties composed of highly research-socialized individuals who believe they can best contribute to society

through advancing knowledge, who must support their work through research and clinical services, and who are attracted to, and attractive to, students who also enjoy research. This is not to say these faculty do not also value and enjoy teaching medical students. But this activity is not highest among their priorities.

#### *Faculty Composition*

Several studies have looked at the effect of faculty composition on specialty choice. As noted above, Campos-Outcalt and Senf<sup>18</sup> found that the proportion of faculty in family medicine was a better predictor than the family medicine faculty-to-student ratio. They thus suggest that relative strength in family practice is more important than having a large number of faculty overall, and they question the value of simply establishing a family medicine department if there is not a large number of regular family medicine faculty to support it. Similarly, Martini et al.<sup>15</sup> reported that the presence of a department of family practice was positively associated with primary care output, but that the total size of the school's full-time clinical faculty was negatively correlated with generalist production.

Recall that Whitcomb et al.<sup>17</sup> found that having a department of family practice, being affiliated with at least three family medicine residency training sites, and sponsoring an AHEC were key characteristics of schools that produced many primary care graduates. It is unclear whether having these entities and affiliations is most important or whether, as a result of these, a critical mass of primary care faculty emerges that influences the culture of the institution in more pervasive ways; that is, by being on major committees (e.g., admission, human subjects, and curriculum), holding leadership positions, and doing a substantial part of the teaching.

An older study by Roos and Roos<sup>24</sup> suggests that it is the critical mass and

academic credibility of primary care faculty that are important. They looked at the effects of medical school characteristics on the career choices of students who graduated from 12 Canadian schools in 1969 (619 students, representing a 60% response rate) and found that academic factors (full-time teaching and research activities) had more influence on career choices than did clinical factors (part-time faculty and residency programs). They suggest that

By hiring more full-time faculty (or encouraging more research) in one area than in another, some schools appear to be causing physicians to enter one field of medicine rather than another. . . . [C]urrent efforts to encourage student interest in general practice by establishing departments of family medicine may be a step in the right direction. . . . If these departments are staffed by full-time professors who legitimate themselves among the rest of the academic community.

Two other studies suggest that primary care faculty need to have more than a teaching role in the medical school in order to positively affect specialty choice.<sup>25,26</sup> These two studies looked at the effect on specialty choice of being taught by family medicine teachers versus teachers from other specialties. These are two of the four in our group of high-quality studies that used experimental designs. Allen et al.<sup>25</sup> looked at the effect of the specialty of the teacher (family practice versus other specialties) for the Clinical Medicine I course at the University of Minnesota Medical School—Minneapolis on students' attitudes toward family practice and on their specialty choices. Clinical Medicine I is a required first-year course, taught over a 12-week period for two half-days per week, in which students are randomly assigned to a family medicine or other specialist to learn physical diagnosis. Approximately 50% of the teachers are family

doctors. Allen et al. found no difference as a result of being taught by a family doctor. Beasley<sup>26</sup> similarly investigated the impact of being taught by family physicians versus internists, in a course entitled Introduction to Clinical Medicine at the University of Wisconsin Medical School. This course involved 113 student-faculty contact hours over the entire second year. He studied 1,097 students from 1981 through 1989, and he also found no difference in specialty choice. These results bring into question the influence of direct contact of primary care faculty with students, at least at this early stage of clinical education. In addition, recall that Campos-Outcalt and Senf<sup>18</sup> found that faculty-to-student ratio is not as good a predictor of specialty choice as is the proportion of primary care faculty. If faculty-to-student ratio is a proxy for student contact, then this further questions the impact of direct teaching by primary care faculty on specialty choice. Rather, it may be that the way primary care faculty influence specialty selection is by being significant players in the organization itself and thereby helping to shape the culture, commitments, and policies of an institution.

Thus, the ownership, mission, and structure of a school have a significant impact on its students' specialty choices by being attractive to different types of faculty and by providing differing levels of support for different disciplines (e.g., internal medicine, general internal medicine, surgery, and family practice). As a result, the school type, mission, and structure determine the composition of the faculty group who make the decisions about who gets admitted to medical school, what curriculum and teachers students experience, and what perceptions students acquire about the different specialties.

There are other things we know about faculty composition at most medical schools. If one looks at higher education in the United States, there is a wide range of higher education schools:

technical colleges, community colleges, small liberal arts colleges, comprehensive universities, and research-oriented universities. In this array of post-secondary institutions, the major research university is quite a small component. However, most medical schools are either affiliated with or in and of themselves major research institutions, with the next largest group affiliated with comprehensive universities. As a result, the larger institution (with which the medical school is affiliated) drives the medical school's mission and policies (e.g., promotion and tenure criteria) and determines the type of faculty who are attracted to and succeed in this setting. This characteristic particularly affects the composition of the basic science faculty. If a basic science academician is more oriented toward teaching or service, he or she has many other schools or corporate opportunities that are a match with these interests. As a result, medical schools have basic science faculty who are highly research-oriented.

Another characteristic of faculty in medical schools is that most of them have no personal or training experience with primary care. The average age of all faculty in higher education by the year 2000 will be 55.<sup>27</sup> If medical school faculty are representative, most physician faculty completed their training in schools that had no departments, clerkships, or rotations in primary care, and probably did residency training in sites with no primary care residents. Many of the physician and basic science faculty are likely not to have any personal experience with primary care physicians and are bound to have misunderstandings and misconceptions about the skills of primary care doctors. Thus, one wonders whether the association found between the proportion of full-time primary care faculty and specialty choice is due to the interaction of the primary care faculty with the students, or whether it is due to an increase in other faculty members' understanding of pri-

mary care through their exposure to primary care colleagues and a resultant increase in the relative status and influence of primary care within the medical school.

### Admission

Admission could affect specialty choice directly via policies that favor student characteristics thought to predict particular specialty choices or indirectly via the individuals who conduct the admission interviews and make the final decisions and who unconsciously bring their own backgrounds and preferences to bear on their perceptions and decisions.

Few studies have looked specifically at the impacts of medical school admission policies on primary care selection. Rabinowitz<sup>28</sup> reviewed the admission policies of all U.S. medical schools in 1978-79 and compared them with the percentages of 1982 graduates from these schools who selected family practice. He found two schools that favored students with rural backgrounds and interests in family medicine, seven schools that gave preference to students with rural backgrounds only, and 108 that reported neither preference. The percentages of graduates from these schools who chose family practice were 24, 15, and 12, respectively. Unfortunately, the schools with the policies favoring students with rural backgrounds or stressing an interest in family practice also have faculty and curricula that emphasize primary care, making the impact of the differences in admission policies on specialty selection unclear.

Combining admission policies with special primary care programs occurred in all the other studies that used admission policies designed to select students who would eventually chose primary care careers.<sup>20,29,30</sup> For example, at the Michigan State University College of Human Medicine, students from rural backgrounds who express a particular interest in family practice are selected

to participate in the Upper Peninsula (UP) program. This program, designed to interest students in and prepare them for rural primary care careers, moves students for their third and fourth years to the upper peninsula of Michigan, 400 miles north of the main campus in East Lansing, and strongly emphasizes ambulatory care. Each of the "mixed" admission and specially designed programs finds that a larger proportion of its graduates go into primary care fields. Again for example, the UP program produces approximately 50% primary care graduates, whereas only 31% of graduates who spend their third and fourth years on the main campus choose primary care. However, it is unclear whether this larger percentage is due to selection or to the program itself. Further, studies often use the remaining pool from which they took their students as the comparison group, thereby overestimating the impacts of their programs, because the comparison group is weighted toward a lower level of interest in primary care.

We found no study that investigated the impact of the admission committee's membership on students' eventual specialty selections. Our model of specialty choice suggests that this is an important variable. Also, studies of admission committees in general suggest this affects the types of students selected. For example, Clayton et al.<sup>31</sup> found that women are likely to be rated lower in medical school interviews than are men. On the other hand, Elam and Andrykowski,<sup>32</sup> in their four-year study of admission interviews at the University of Kentucky College of Medicine, found no association between ratings given by admission interviewers to applicants and applicants' gender, age, or rural backgrounds. However, in the latter study, each applicant was interviewed by two interviewers, whose ratings often did not agree, and interrater agreement was found to decrease with greater differences in interviewer characteristics: professional background, gender, and whether a non-

committee member (some faculty and hospital staff not on the admission committee) served as a interviewer. These findings suggest that differences do occur in admissions depending on the backgrounds of the people involved in the admission process.

In sum, there is no research to inform us about the impacts of admission policies and committees on the numbers of primary care students produced. As we describe later in this report, it does seem that students' incoming demographics, backgrounds, and personality types influence their eventual specialty selections. Thus, it is surprising to find that very few schools have tried systematically to modify their admission policies, recruitment strategies, and admission committee makeups to positively influence the numbers of students who select primary care. Undoubtedly, there are some schools that have manipulated these admission variables to increase the production of primary care physicians but have not published their results.

### Curriculum

Many of the studies of specialty selection investigated the impact of the curriculum. The following describes these studies clustered by when the curriculum occurred: courses in the first two years, clinical rotations in the third or fourth year, longitudinal experience across one or more years, separate curriculum tracks, or residency training.

**Years One and Two.** As described above, two studies<sup>25,26</sup> used randomized designs and good outcome measures to study the impact on specialty choice of being taught by family practice teachers versus other specialists in the clinical medicine courses taught in years one and two. Allen et al.<sup>25</sup> also investigated the impact of the sequence in which students took four required second-year preceptorships, one of which was in family medicine. No difference in attitudes toward family practice or eventual residency selection was found. Jones<sup>33</sup>

similarly found that participation in a summer assistantship with a family physician during the summer of the first year or between years one and two had no significant impact on eventual residency selection. Mengel et al.<sup>34</sup> studied all U.S. medical schools and their graduates in the years 1980, 1985, and 1990 and compared the presence of each of 12 types of "generalist" courses in the first year with the percentage of students who chose family practice four years later. They conducted separate multiple regressions in each cohort of students for each type of course and found no association. While these generalist courses could have widely variable definitions, thereby limiting the interpretability of the results, this study does suggest that first-year courses on generalist topics do not influence students' later career decisions.

**Years Three and Four.** Several studies have compared the production of family physicians among all U.S. medical schools with and without a required family practice clerkship, using either the AAMC GQ to identify residency choices or the American Medical Association's Physician Master file to identify the actual practice specialties of graduates.<sup>18,19,35-37</sup> All these studies found an association between the presence of a required family medicine clerkship and the proportion of students selecting family medicine but no association when the clerkship was elective. Stine et al.<sup>36</sup> also found that a required primary care clerkship had no impact unless at least 30% the students in the clerkship had family practice teachers. Rabinowitz<sup>37</sup> reported that a larger proportion of students selected family practice when the required clerkship was in the third year (16.8%) than in the fourth year (14.5%). However, Campos-Outcalt and Senf<sup>18,19</sup> found that proportion of family practice faculty, ownership, and weeks of required family practice curriculum were the three school characteristics that were most powerful in predicting the proportion of students selecting family practice.



They concluded that the number of weeks of required curriculum is more important than when the curriculum is offered. Of course, these studies describe only associations, and do not allow for cause-and-effect conclusions because other variables are likely to be different in a school with a required family practice clerkship.

Other studies have used one school's experience and examined the impacts of unique six-week to eight-week primary care clerkships, such as those taking place in a rural setting, in an AHEC setting (both rural and inner-city), or in a community physician's office, on student attitudes.<sup>18,38-43</sup> Each of these studies found that students had a more positive attitude toward family practice or primary care after the clerkship. Further, Duerson et al.<sup>42</sup> found that the positive impact was most noticeable in students who had been undecided about their specialty choices before the clerkship, the very students one would hope would be influenced by such an experience. However, four of these studies also found no significant increase in primary care specialty choices at graduation as a result of participating in the clerkship. Pre-clerkship preferences are still more predictive of eventual specialty choices than are post-clerkship preferences.

Finally, Potts and Brazeau<sup>43</sup> wondered whether the sequence in which a student took his or her required clerkships would influence specialty choice. They found no significant difference in specialty choices as a result of clerkship sequence.

**Longitudinal.** Three studies report the impacts of longitudinal primary care educational experiences.<sup>44-46</sup> At the State University of New York Health Science Center at Syracuse College of Medicine every fourth student admitted is assigned to do the third year at the clinical campus in Binghamton. At the clinical campus, students complete the usual rotations in a more community-oriented hospital and spend one half-

day per week in the office of a primary care physician. The Syracuse campus does not have this primary care experience. In four of the nine years studied, significantly higher proportions of graduates from the clinical campuses entered primary care. Also, when the data from the years were combined, there was a significant difference (21.3% versus 10.9%). These results are reminiscent of those of an older study<sup>47</sup> in which medical students at the University of Utah School of Medicine were randomly drawn from a pool of applicants to participate in a program that consisted of a series of primary care experiences across the four years, such as a first-year patient advocate course, home visits, a primary care preceptorship one half-day every other week, a four-week family practice clerkship, and a four-week emergency room rotation. By graduation, 46.3% of the participants but only 16.1% of the non-participants chose family practice careers. The Rural Physicians Associate Program (RPAP) at the University of Minnesota has produced 457 graduates since 1971. From a pool of self-selected applicants, this program admits about 30 students per year, based on academic ability, maturity, interest in rural practice, and career goals. The students then spend nine months of their third year with a family practice preceptor in a rural Minnesota community. Seventy-four percent of the RPAP graduates have chosen primary care careers; of these, 64% are family physicians.

Another longitudinal experience did not have such impressive results. The University of South Florida College of Medicine randomly selected from among volunteers participants for a four-year one half-day per week primary care experience in a free clinic for the uninsured. The researchers found no significant difference between participants and non-participant volunteers with regard to selecting primary care careers, although the small difference they did find was in a positive direction. While this

study was well-designed, the primary care outcome measure included choice of internal medicine and pediatrics subspecialties, and the study had a rather small sample size (only 93 students participated over the study period). Finally, students may get an atypical picture of primary care when their only primary care experience is in a free clinic.

**Separate Curriculum Track.** Several studies report the impact on specialty selection of having a separate curriculum over the entire four years of medical school: Jefferson Medical College of Thomas Jefferson University has the Physician Shortage Area Program, Michigan State University has the Upper Peninsula program, Harvard Medical School has the New Pathway program, the University of New Mexico School of Medicine has the problem-based Primary Care Curriculum (PCP), the University of Washington School of Medicine has the Washington, Alaska, Montana, Idaho (WAMI) program, and McMaster University's entire curriculum is problem-based.<sup>20,29,30,48-50</sup> The Jefferson and Michigan State programs were both specially designed to produce more family doctors, and they do so. However, since these programs specifically recruit students who are already interested in family practice, the impact of the curriculum is unclear. The Harvard, New Mexico, and McMaster programs were designed to provide problem-based alternatives for students. The Harvard students are randomly assigned to the New Pathway from a pool of students who express a willingness to participate. They found that a higher, but not statistically significantly higher, proportion of the New Pathway students chose primary care residencies (58%), compared with the control group (40%) or with the traditional group (45%). New Mexico selects students for the problem-based PCP from a pool of interested students, based on cognitive and noncognitive factors. The investigators found that the problem-based students who expressed an

interest in family medicine at orientation were more likely to retain this interest at graduation than were conventional-track students (42% versus 29%). In addition, by graduation a significantly larger percentage of PCP than conventional-track students had switched career preferences to family medicine from other specialty preferences (39% versus 14%). However, keep in mind that the PCP students had all expressed an initial interest in primary care in order to be considered for the program. So, again, because of selection bias, the impact of the curriculum alone is unclear.

The WAMI program is interesting in that it takes students from Washington, Alaska, Idaho, and Montana, all of whom spend their first year in their own states' schools and their second year at the University of Washington School of Medicine. All University of Washington students can then take their third- and fourth-year clerkships in family practice, internal medicine, obstetrics-gynecology, pediatrics, and psychiatry in 17 different towns across the four states. Before WAMI (pre-1974), 31% of the University of Washington's students entered primary care. Since the advent of WAMI 51% have done so. Of those post-1974 students without WAMI experience, 27% entered primary care; of those with WAMI clinical experience, 61% entered primary care. Adkins et al.<sup>50</sup> do not say how many of the WAMI students experienced several WAMI rotations. These authors suggest, however, that it is the remote-site experience that influences specialty selection. It may also be that students who are already interested in primary care are most likely to elect to take WAMI rotations. Unfortunately, except for Harvard's, these unique curriculum tracks have all selected students on the basis of interest in family medicine or primary care and, further, have created no reasonable comparison group. Thus, from these studies, one cannot conclude that unique curriculum tracks are signifi-

cantly influencing students' specialty choices.

**Residency Curriculum.** Physicians who complete primary care internal medicine residencies are more likely to become practicing general internists (82%) than are those who complete traditional residencies (38%).<sup>51</sup> This is also true for pediatrics (88% versus 81%).<sup>51,52</sup>

Two other studies report similar results.<sup>53,54</sup> These studies compared students' planned career specialties reported on the AAMC GQ with their actual practice careers, three to nine years later<sup>54</sup> or six years later.<sup>53</sup> The studies found that the percentages of students who were in their planned careers when followed to practice were 91.5% for family medicine, 85.2% for general pediatrics, and 55.7% for general internal medicine.<sup>54</sup> Singer<sup>53</sup> makes the interesting observation that the GQ is a remarkably accurate indicator of the actual specialty distribution of specialists once the graduates are in practice. However, when he carefully tracked graduates through their residency years he found that, though the proportions of residents in the specialties were the same as indicated by the GQ, the people who eventually went into the specialties were not the same people who had planned to do so at medical school graduation, especially among the non-primary-care specialties. While there was a great deal of switching from planned careers during residency years, those who planned primary care careers remained very stable in their specialty choices.

In an older study, Linn et al.<sup>55</sup> looked at the relationship of work satisfaction and career aspirations of internal medicine residents in 15 departments of medicine funded by The Robert Wood Johnson Foundation to develop ambulatory care practices within their medical centers. They found that of the residents enrolled in the seven primary care residencies within these 15 departments, about 40% planned further sub-

specialty training, while 70% of their counterparts in traditional programs planned subspecialty training. The primary care residents also reported significantly greater job satisfaction than did the residents in traditional programs. Further, among the residents in the traditional programs, there was a significant negative correlation between plans to subspecialize and satisfaction with the group-practice portion of the residency program. This suggests an association between having a good ambulatory care experience in residency and choosing a primary care career. Once again, however, the participants in the primary care and traditional residency programs choose their sites of training, and probably differ in career aspirations at entry.

In summary, because of the way most of the studies designed to investigate medical school curricula have been constructed, it is impossible to determine whether the greater effect comes from the curriculum experiences themselves or from the selection processes. It is safe to conclude, however, that if these curricula have any effect on specialty choice, it is a positive one. In considering the research on both school characteristics and curricula, it seems likely that a curriculum providing experiences that are longitudinal, last more than six weeks, and occur in actual primary care offices away from the highly specialized academic centers will have a higher proportion of students selecting primary care careers. Also, with regard to residency curricula, both family medicine and pediatrics are highly successful in retaining physicians in primary care. Primary care internal medicine programs are more successful than traditional programs (56–82% versus approximately 35%).

#### *Incoming Students' Characteristics and Values*

The most prevalent type of study in the specialty-choice literature seeks an as-

sociation with student characteristics, most often as a direct determinant of specialty choice. Our model suggests that many student characteristics affect specialty choices by determining the values that each person holds, and therefore influencing the needs that he or she wishes to fulfill with a career. Some of these characteristics may be inherent, such as personality and gender, and others may be environmental, such as family influence, economic background, and cultural beliefs.

**Gender.** Women and men differ in their specialty selection patterns; however, this effect is diminishing with time. Twenty years ago, women who entered medicine clustered into obstetrics–gynecology and general pediatrics, while surgery and the subspecialties of internal medicine and pediatrics were male-dominated. In a 1989 study, Schermerhorn and Verhulst<sup>56</sup> demonstrated that contemporary women medical students were more similar to their male counterparts in their specialty preferences than they were to female physicians who had been in practice for 20 years, though women continued to be more likely than men to choose pediatrics and less likely to choose surgery. Another study compared the psychosocial characteristics of women and men within the same specialties (internal medicine and family medicine) and found that they were psychosocially alike, and that students who chose family medicine were “people-oriented” regardless of gender.<sup>57</sup>

Nonetheless, many studies have found a significant difference between men’s and women’s choices of primary care demonstrating a tendency for women to choose family medicine, pediatrics, and general internal medicine.<sup>51,58–64</sup> Carr showed that this also holds true after medical school graduation—among internal medicine residents. Although women and men in internal medicine were equally likely to have chosen a primary care training program, women were significantly

more likely to later practice general internal medicine, regardless of the type of residency (primary care or traditional). Motives for entering medical school and for choosing their specialties also differ between men and women, with women rating relationships with patients and peers higher and income and prestige lower than men, on average.<sup>59,65</sup>

Gender may have an important relationship to other variables that may influence specialty choices. Crandell<sup>66</sup> found that women consistently scored higher on a scale that measures attitudes toward providing medical care to the underserved. In an older study, Abbott<sup>67</sup> found that women scored higher on a humanism scale, and that the scores differed significantly by specialty as well. Factors such as the limited time to bear children and increased tendency to take time off or work part-time may lead women toward certain specialties and limit their postgraduate training. Characteristics that are associated with specialty choice, such as “people orientation,” though perhaps more predominant among women, can be found among either gender and these traits, rather than gender itself, may actually be the factors for which we should select students.

**Age and Marital Status.** Being older at matriculation, being married, and having children have positive associations with primary care specialty choices.<sup>63,64</sup> One study showed that the students who had maintained their original preferences for family practice were older on average than those who had switched to other specialties.<sup>68</sup> In contrast, studying only those students who had switched specialties from their initial preferences, Markert<sup>41</sup> did not find a difference in age or marital status between those who had switched to primary care and those who had switched away from it.

Reasons for these associations may be that older students prefer specialties with shorter residency training so that

they will have more time in practice and can meet financial obligations, an especially important consideration for those who have dependents. Motivations for entering medical school may be different among older students, and mature students may be more committed to their original plans and therefore less influenced by the socialization process, which, as described below, may play a part in the large shift of students’ preferences away from primary care specialties.

**Ethnic and Socioeconomic Background.** Studies focusing on the specialty choices of students with different ethnic and socioeconomic backgrounds have had mixed results. Lieu et al. found that primary care specialties were chosen less frequently by students of underrepresented minorities but found no association with a socioeconomic “disadvantage” rating. In contrast, Gorenflo et al.<sup>69</sup> did not find race–ethnicity to distinguish students between specialties at the University of Michigan, though having a physician in the family (a possible proxy for higher socioeconomic status) was associated with non–primary-care choice. Parental education was not a significant factor among minority and non-minority medical students at the Tulane University School of Medicine between 1972 and 1977,<sup>70</sup> and racial–ethnic background was not found to be a major factor influencing specialty choices among all 1987 graduates who completed the AAMC GQ.<sup>71</sup> In the latter study, only minor differences in specialty preferences between ethnic groups existed at matriculation, and the preferences of the groups converged further by graduation. However, combining AAMC GQ responses between 1980 and 1989 revealed a statistically significant difference, in that a higher proportion of Mexican American men and women than men and women from other racial–ethnic groups planned primary care careers.<sup>72</sup> Finally, two studies of all “young” physicians in the United States

(in practice one to seven years) showed that higher percentages of black and Hispanic physicians than white or "other" minority physicians practiced primary care,<sup>54,60</sup> indicating that a difference exists among racial-ethnic groups in actual practice patterns—again, choice at medical school graduation is an inaccurate measure of actual primary care choice.

A relationship exists between racial-ethnic background and socioeconomic status. Underrepresented minority students are more often indebted and have higher educational debts than non-minority students.<sup>73</sup> These minority students are also more likely to be interested in practicing in a socioeconomically deprived area. That students whose parents are physicians tend to choose non-primary-care specialties<sup>69</sup> may be a reflection of socioeconomic status, increased knowledge about the specialties, the relative status of primary care within the medical community, or the family support given for their choices. The associations between specialty choice and racial-ethnic and socioeconomic backgrounds are not simple ones, but the variables involved are frequently studied in isolation from one another, making it difficult to understand the nature of the relationships.

**Geographic Background.** Some investigators have demonstrated with small populations that students from small towns or rural backgrounds are more likely to choose primary care careers.<sup>30,68,69</sup> Rabinowitz<sup>30</sup> compared schools with and without admission policies that favored students with rural backgrounds and/or preferences for family practice and found both to be associated with higher proportions of students choosing family medicine. Schools that have such policies, however, are likely also to have differences in their administrative structures and curricula, which make these results difficult to interpret.

Students from small towns are the most likely to practice in a small town after medical school and resi-

dency.<sup>29,30,74</sup> Carline and Greer<sup>74</sup> demonstrated this relationship but found few differences in student preferences for specialties based on size of home community. The association of home-community size with practice location has been more consistently shown than the association with specialty choice. However, as serving a rural population requires broad-based training, the desire to practice in such an area may have a considerable influence on specialty choice.

**Academic Background.** The 812 students who entered Jefferson Medical College between 1985 and 1988 were studied at admission according to their undergraduate majors. No difference in freshman specialty preferences by academic major or medical school performance was demonstrated.<sup>75</sup> In another study, medical school graduates grouped according to their specialty choices demonstrated no difference in undergraduate majors or levels of achievement.<sup>63</sup> In contrast, Koenig<sup>76</sup> found that those students who had had "broad-based" undergraduate preparation (defined as having had a non-science major and having been involved in various extracurricular activities) were more likely to choose specialties with high levels of physician-patient interactions, specifically the fields of family medicine, internal medicine, pediatrics, obstetrics-gynecology, and psychiatry. These students performed less well on the science portions of the National Board of Medical Examiners Part I examination than did "science-focused" students, but performed equally on Parts II and III. Finally, no association has been found between specialty choice and type of school attended (public versus private) for undergraduate education.<sup>63,69</sup>

**Personality.** A variety of measures have been used to study personality characteristics as factors in career choice. The Myers-Briggs Type Indicator (MBTI) classifies personality dichotomously on four dimensions, re-

flecting a preference for E-I, extroversion or introversion; S-N, sensing or intuition; T-F, thinking or feeling; and J-P, judging or perceiving.<sup>77</sup> This instrument has been used to distinguish various specialists, with only limited success.<sup>68,77,78</sup> In one study, the MBTI was found to be predictive of the specialty choices of 640 students in North Carolina on three dimensions, with students choosing family medicine tending to be sensing, feeling, judging types. These effects were modest in size, and corresponded to an increase in the probability of a student's choosing family medicine from 14.4% to 24.5%. Though this is a statistically significant change, the investigators note, "at a practical level it implies a skewing of the odds rather than a determination of the future."<sup>77</sup>

The California Psychological Inventory (CPI) has also been used to predict specialty choice. Students were given the CPI at entry to medical school, and the scores were compared with their actual specialty choices at graduation. When the students were classified into the specialty groups of highest and second-highest probability, the actual specialties chosen were included 77% of the time.<sup>79</sup> A similar study with a larger sample did not show such promising results, but rather revealed a predictive value of the CPI of only 14.2%, not significantly different from chance.<sup>80</sup>

The students at Rush Medical College of Rush University were administered ten different personality measures during their medical school experience. The personality profiles of students who selected each of seven specialty categories were then compared, and significant differences were noted and used to develop a model for predicting specialty choice. Unique equations were created for the individual specialties and were successful in predicting the correct specialty for as many as 87.5% of students for obstetrics-gynecology and 68.8% of students for pediatrics. However, the model had no predictive value for inter-

nal medicine or family practice. In fact, the average scores on all components for students choosing family practice closely approximated the mean scores for all students. This could indicate that students who choose family practice are either very diverse or that they are very similar but have equal distributions around the means on these scales. Either way, however, these results do suggest that, though predominant personalities do differ between specialties, personality measures may not be very useful in predicting the eventual choice of primary care.

Finally, Budner's Intolerance of Ambiguity (IOA) scale has been used often to study medical student career choices. Budner originally classified specialties by descending level of ambiguity: surgery, obstetrics, pediatrics, internal medicine, family practice, and psychiatry and neurology. Four studies by Sobal and DeForge<sup>81-84</sup> used this scale to predict students' preferences for one of these specialties. In their first study,<sup>84</sup> IOA differed statistically among freshman by specialty preference, but this difference disappeared when demographic variables such as age, sex, birth order, undergraduate major, and achievement were taken into account. A follow-up study<sup>81</sup> compared IOA with specialty choice at graduation and found no association. The same authors also used Budner's scale to assess the construct validity of an instrument to predict students' abilities to deal with uncertainty,<sup>82</sup> which again showed no relationship with specialty choice. Recently, they hypothesized that intolerance of ambiguity may be not a personality characteristic but a malleable trait that changes in response to social influences. They found that the test-retest reliability of the scale was .64, indicating either instability of the trait or only moderate reliability of the measurement.<sup>81</sup> Geller et al.<sup>85</sup> examined this hypothesis as well, by measuring intolerance of ambiguity in first- and fourth-year medical students as a proxy for a

longitudinal study to see whether a change occurred over the medical school experience. No difference was found between the classes, but tolerance for ambiguity increased with age and female gender. Their results differed from those of the other studies in that IOA was highest among those students who preferred psychiatry, followed by medicine, family practice, pediatrics, obstetrics-gynecology, and surgery.

It seems that personality type, as we are currently able to measure it, is not a very powerful predictor of primary care specialty choice. Other instruments may need to be developed specifically for this purpose. Medical students differ from the general population in being, as a whole, more excessively competitive, academically overspecialized, overachieving, highly motivated, and self-disciplined.<sup>86</sup> The currently used measures may not be sensitive enough to distinguish between members of this homogeneous group. Alternatively, as the underlying constructs of the above-mentioned personality measures are not the ones we would hypothesize to predict specialty choice, it may still be that we are simply not measuring the appropriate traits. Future measures should thus address other traits, such as motivational factors and values that may be related to specialty choice or to the perceptions of the profession with which students identify.

**Career Expectations at Matriculation.** More subjective measures that may distinguish students who will later choose primary care specialties include initial specialty preference and anticipated future income.<sup>74,87-89</sup> Rabinowitz<sup>89</sup> used AAMC data to study all medical students who graduated in 1983 and found that although only 24% of the students who indicated initial preferences for family practice entered the specialty, this figure was three times higher than the number of those who did not specify this preference. Initial specialty preference for family med-

icine and low-income expectation have been shown to be significantly and independently related to choice of family medicine at graduation.<sup>88</sup> Unfortunately, most students do not ultimately choose the specialty that they originally prefer, and the direction of change is away from primary care. This is discussed in more detail below.

### *Factors Affecting Graduates' Values*

Our model suggests that many factors combine to determine entering medical students' values. However, it is the things that a student values at graduation that will determine the needs he or she wishes to fulfill with a career. As mentioned, medical students often choose specialties other than the ones for which they specified preferences at matriculation, and the direction of the changes is predominantly away from primary care.<sup>90</sup> Therefore, events that occur during the four years of medical school may change a student's values or needs. For example, a student may get married or have a child, or debt may be incurred for the costs of medical education. He or she may be, to varying degrees, affected by the socialization process that occurs during professional education, or may simply overcome a lack of knowledge about specialty options.

**Indebtedness.** Studies of debt do not show a consistent relationship with specialty choice.<sup>73,91-94</sup> In one study, indebtedness was not found to discriminate between graduates expressing primary care versus non-primary-care specialty choices, except that students who had very large debts were less likely to choose primary care specialties. Receipt of a federal scholarship was a powerful discriminating variable, followed by attendance at a public school, being married, being female, and receipt of a non-federal scholarship.<sup>91</sup> In another study, Fox<sup>92</sup> found that including the more lucrative field of obstetrics-gynecology within the definition

of primary care diminished the already small correlation between debt and specialty choice. Without obstetrics-gynecology included, though the association was statistically significant, a \$10,000 increase in debt corresponded to less than a 1% increase in the probability of choosing a non-primary-care specialty. Controlling for attendance at a public versus private medical school also diminished the observed association. Finally, Kassebaum and Szenas<sup>93</sup> found that median levels of debt were not different among students choosing different specialties, but that more students with debts of over \$75,000 planned careers in anesthesia, emergency medicine, psychiatry, and neurosurgery than in primary care. Students within the highest debt category who chose generalist careers rated length of residency higher as a positive influence than did the other students. The same investigators<sup>73</sup> found that students from underrepresented minorities were more likely to have accumulated debt than other students and that their debt loads were higher. Debt has a larger role in decision making among underrepresented minority students, by their own reports, especially among those choosing surgical and support specialties.

An important feature of all of these studies is that the association of debt with specialty choice was attenuated by the inclusion of public versus private medical school in the analysis. Students who attend private medical schools are less likely to enter primary care specialties and tend to have higher median debts than students who attend public schools (\$68,000 versus \$45,000).<sup>73</sup> Indeed, Spar et al.<sup>94</sup> studied only students attending private schools and found no difference between indebtedness and the choice of specialties compared by potential income.

Two possibilities exist to explain the lack of association of indebtedness with specialty choice. One is that there truly is no influence. The other is that the influence is nonlinear or widely variable

in both direction and magnitude. Indebtedness may influence students to choose specialties with higher expected incomes in order to improve their repayment prospects, or to choose specialties with shorter training programs in order to lessen their continued debt accrual. Certainly, factors such as family obligations and each student's aversion to maintaining a high debt level would contribute to this decision. In short, however, debt is not a reliable predictor of specialty choice.

**Socialization.** Students in professional schools gain more than just knowledge to undergird their practice. They also acquire the professional attitudes, values, and social skills of their chosen professions. Our model suggests that the values and attitudes students acquire through socialization are those most dominant in the values and culture of the school itself.

Several investigators have presented compelling evidence that medical education influences the attitudes and even the personalities of students. As students progress through medical school, they experience a decrease in humanistic orientation and an increase in hedonism.<sup>65,66,95,96</sup> For example, Crandell et al.,<sup>66</sup> using a cross-sectional approach, measured the attitudes of students in both the first and fourth years of medical school toward serving the underserved and found a significant decrease in these attitudes between the first and the fourth year. An older study,<sup>96</sup> using the same cross-sectional approach, found fourth-year students to have a greater orientation to the profession and working conditions and a lesser orientation to patient care than freshmen. Students choosing primary care scored higher on orientation to patient care and lower on orientation to the profession than those choosing other specialties at both freshman and senior levels.

Other studies indicate that medical students experience a different developmental process than graduate students in other fields. Kohlberg's Moral Rea-

soning Scores were used to test the hypothesis that the medical education experience inhibits the normally expected increase in moral reasoning.<sup>97</sup> The results showed no increase in average moral reasoning scores from the first year to the fourth year in a single sample of 20 medical students. This is in contrast to a general increase in moral reasoning skills with maturity seen in studies with other populations. In addition, the variance in scores significantly diminished between the first and fourth years, suggesting a convergence in moral reasoning and therefore a socialization process.

Studies of professional socialization in general, and these and other studies of attitude changes of medical students in particular, suggest that the norms and culture of the medical school environment may play a significant role in shaping the values of graduating students. Thus, to influence student values, it may be necessary to change the values of the faculty and thus the culture of medical schools in general.

#### *Needs to Satisfy*

The Bland-Meurer model suggests that values at graduation will affect the needs that each student wishes to satisfy with his or her career. These values, as shaped by such factors as the educational environment and culture, life events, and the incurring of debt, will determine the degree to which a student weighs his or her own relative needs to satisfy self, to serve society, or to meet the expectations of others in the career decision. There is little good research in this area, although many authors have attempted to ascertain the reasons behind various specialty choices, thereby suggesting the needs that students hold in high priority. Numerous studies have retrospectively asked students what factors influenced their specialty choices, including altruistic motives, the influences of others, and income and prestige as variables of

interest. However, because of the low validity and reliability of the data-collection instruments used, most of these studies were rated too low to permit their inclusion in this synthesis.

However, Gorenflo et al.<sup>69</sup> used the theoretical framework of reasoned action to develop an instrument with which to investigate how demographics, attitudes, social influences, anticipated income, and debt influence a primary care versus a non-primary-care specialty choice. The investigators asked students to rate 25 career aspects according to their importance to them, and the levels to which these aspects were present in their preferred specialties. The aspects included such things as providing health care to children or to the elderly, level of patient contact, number of work hours, length of residency, prestige, and opportunity to operate on patients. Students who preferred primary care specialties were found to desire patient contact more strongly and to be more interested in serving a diverse population, treating a variety of medical problems, and caring for healthy patients. This group was less concerned about practicing hospital-based medicine, performing surgery, malpractice issues, income, and prestige than were students who preferred other specialties. The influences of faculty, residents, peers, parents, or spouse were not significantly related to specialty choice in this study. In contrast, Montano et al.<sup>98</sup> found that non-primary-care students' perceptions of their social support for choosing family practice as a career were lower than for other specialties, while students who chose family practice believed their social support to be the same regardless of specialty chosen. This may suggest that meeting the expectations of others is an important influence for some students.

One additional study suggests that students' specialty choices vary with their career needs. Nieman et al.<sup>99,100</sup> examined career needs indirectly by asking students to choose which type of

physician they wanted to become: "primarily a scientist who helps people using a high degree of scientific knowledge" (bioscientific orientation) or "primarily working directly with people, being of service to them, and treating their illnesses using science pragmatically" (biosocial orientation). They found a higher proportion of students who preferred primary care specialties to be biosocially oriented.

#### *Perceptions of the Specialties*

When deciding whether specialties match their values and constraints, students consider key characteristics of the specialties, including patient contact, workload, work hours, flexibility, types and diversity of health care problems, income, prestige, use of technology, surgery, and the apparent career satisfaction of current members of the specialty. It is unclear how accurate students' perceptions of these key aspects of each specialty are, or how these perceptions develop. Most students learn about the specialties in medical school through participating in courses and through observing faculty, residents, and other students, thus using this "academic picture" of the specialties to judge each as a possible career. If these experiences do not truly reflect the "real world," then the student's perception may be distorted, and he or she may not choose the specialty that would truly fit his or her career needs. For example, many students learn about internal medicine purely through the care of chronically or severely ill hospitalized patients with whom they have never developed a relationship, under the supervision of interns who are overworked and often dissatisfied. A hospital rotation that does not reflect the community practice of the general internist would undoubtedly create an inaccurate perception of the specialty.

Support for this hypothesis can be found in the literature. To better understand the decreasing medical student

interest in internal medicine, an open-ended question was used to elicit students' suggestions for "improving the attractiveness of internal medicine" as a career. The most common comments concerned relationships with patients, attending physicians, and residents; the learning climate; stress; and workload. Status was mentioned more often by men than by women, and relationships more often by women. Schwartz et al.<sup>101</sup> also studying students' interest in internal medicine, found that the factors students reported as pushing them away from a career in internal medicine were taking care of chronically ill patients, the low level of satisfaction among interns and residents, workload, and stress. Again, these studies indicate that students acquire a negative perception of the specialty of internal medicine—a perception that may not reflect the actual characteristics of the specialty.

In sum, students differ from one another in the aspects of specialties that they consider to be important and also in their perceptions of the various specialties. Choosing students whose values and needs match well with primary care specialties may attract graduates, but only if the students' perceptions of the specialties are accurate. If so, they may then truly choose the specialties that suit them best. As a caveat, however, Savickas et al.<sup>102</sup> reported that the most prevalent difficulty that students encountered in choosing specialties was a lack of information about the specialties. It seems clear, therefore, that faculty would serve students well in their specialty-choice process by helping them to develop accurate perceptions of all specialties. To date, little research is available on the accuracy of students' perceptions or on the effects of various programs—such as curricular experiences, role-modeling, or mentorship—on these perceptions.

Finally, if students' perceptions of the specialties are already accurate, then to attract students to generalist specialties the characteristics of those specialties

may have to be manipulated to meet student needs, such as relative income, status, or lifestyle.

### Specialty Choice

Most students do not enter medical school secure in the knowledge of what specialties they will eventually choose. Employing AAMC data, Babbott et al.<sup>90</sup> demonstrated that nearly 80% of students indicated on the GQ specialties other than the ones they had cited before matriculation. Rabinowitz<sup>89</sup> also found that only 24% of students who had preferred family medicine upon admission chose the same specialty at graduation. Another study reported that when given the chance to rate more than one specialty as a possible career on a 1–5 scale, entering students rated their eventual specialties as those that they were at least “moderately inclined to select” 70% of the time (corresponding to a 4 on the scale) and “strongly inclined to select” 37% of the time (5 on the scale).<sup>74</sup> This suggests that initial specialty preference is not as unreliable a measure as asking for a *single* specialty would indicate. Also, Nieman et al.<sup>99</sup> distinguished between *career preferences* and *actual choices* and showed that 24% of third-year students identified a specialty preference that was different from the one they would have preferred if there had been no impediment to their choices. This confusion as to what students are reporting in studies (their unimpeded preferences or their realistic choices), calls into question the validity of many of the studies of specialty preference stability.

The actual timing of specialty choice differs between students, and among specialties. To better understand this phenomenon, Brooks<sup>103</sup> asked the same group of students what their career choices were at the end of the preclinical period and also at graduation, and found that 37% had changed their specialties over this time, usually from primary care toward the surgical special-

ties. Two other studies<sup>87,104</sup> looked at the timing of career choices by asking students for their career preferences at six different times during medical school. Forty-five percent of the students had named their eventual specialties at matriculation, but half of these had identified different preferences at some time during medical school, and 40% of students remained stable in their choices from the end of the second year. Not surprisingly, interest in a particular specialty peaked immediately following its clerkship. When specialties were compared as to the times at which students committed themselves (defined as never again indicating a different preference) 40% of students choosing internal medicine and family practice “committed” themselves to these specialties at orientation, and the proportion committed gradually increased until graduation. Other specialties had very few students committing in the first two years, but showed rapid increases during the clerkship period. Again, most students indicated primary care careers initially but abandoned their primary care preferences during the clinical clerkship period.

Very little is clearly understood about the process of specialty decision making. How do students actually match their needs to the characteristics of the specialties? Katz et al.<sup>105</sup> liken the process to hypothesis testing, whereby students make an initial selection (a hypothesis) and test this hypothesis against experiences and new information. If the initial choice fails the tests, a new hypothesis (specialty preference) is generated. As described above, Carline and Greer<sup>74</sup> disagree with this analogy, suggesting that students enter medical school with any number of specialties being equally viable choices, rather than with one clear preference.

Nieman et al.<sup>99</sup> suggest that the decision-making process differs for students interested in various specialties, and demonstrated that students preferring family practice first considered their

specialty and maintained their specialty preference from an earlier stage in medical school. Non-family-practice graduates, on the other hand, were more diligent in their decision making; they consulted a greater number of sources and ruled out a greater number of specialties as they became more committed to their eventual specialties. Other recent literature on specialty decision making is difficult to find, as most career-decision instruments that distinguish well between career fields are not able to accurately distinguish between people in the same career field.<sup>106</sup>

Savickas et al.<sup>106</sup> developed a valid and reliable instrument to measure and explain specialty indecision among medical students by modifying the Career Decision Scale.<sup>107</sup> They found that four types of constraints impede the decision-making process: (1) *cognitive restraints*, including the need for more information about specialties or the limitations of one's interests and abilities; (2) *conative restraints*, having to do with the negative emotional responses to the task of making a final decision; (3) *criterion restraints*, expressing excessive standards for a choice to meet; and (4) *implementation restraints*, questioning how to effect a choice. This instrument demonstrated that the most prevalent difficulty that students encounter during their specialty decision was the lack of information about the specialties (65%), followed by the perceived equal appeal of several specialties (54%), diverse interests (52%), lack of support in making a decision (40%), “not knowing one's interests” (25%), and “not knowing one's abilities” (24%). Savickas et al. suggest ways in which faculty members can assist students in choosing appropriate specialties throughout the four years of training.<sup>102</sup>

### CONCLUSIONS

There is a great deal of literature on primary care specialty choice. The re-



search tells us that students enter medical school with a preference for primary care careers, but that this preference diminishes over time (particularly over the clinical clerkship years) and is replaced with preferences for subspecialty careers. Several student characteristics are associated with the choice of a primary care career: being female, being older, being married, having a broad undergraduate background, having non-physician parents, having relatively low income expectations, being interested in diverse patients and health problems, and having less interest in prestige, high technology, and surgery. The research suggests that other traits, such as value orientation, personality, or life situation, which have yet to be reliably measured, may actually be responsible for some of these associations. Two curricular experiences are associated with increases in proportions of students choosing primary care: required family practice clerkships and longitudinal primary care experiences. Overall, the number of required weeks in family practice shows the strongest association. Evidence also exists that students are influenced by the culture of the institution in which they train, and that an important factor in this influence is the relative representation of academic primary care faculty within the institution's governance and everyday operation. The faculty composition determines the curriculum and admission policies, and a critical mass of primary care faculty can affect these as well as shape the attitudes that other faculty hold about the generalist specialties. Finally, the institutional culture and faculty composition are largely determined by the school's mission and funding sources. This helps to explain the strong and consistent association frequently described in the literature between public school type and a greater output of primary care physicians.

The Bland-Meurer model depicts these relationships, with the basic

premise that career choice is accomplished as a student finds the specialty whose characteristics best match his or her own career needs. The research that explores specialty decision making uses predominantly student self-reports and has limited reliability. It is clear, however, that students view a lack of understanding of the specialties as a major impediment to their career decisions, and that they may acquire distorted images of the primary care specialties as they learn within major academic settings.

On the other hand, several of the commonly accepted ways to influence specialty choice are not supported by the research. Early exposure to family practice faculty or to family practitioners in their own clinics does not influence specialty choice. Having a high family medicine faculty-to-student ratio does not influence specialty choice. Debt level does not significantly influence specialty choice.

We were also struck by how few schools produce a majority of primary care graduates, defined as the number who select family practice, internal medicine, or pediatrics residencies. Further, when primary care graduates are counted as the number of students who go into family practice, general internal medicine, or general practice residencies or who actually practice as generalists, the proportion is much less than 50%. Even special tracks that are designed to produce primary care doctors and select as participants only those interested in primary care seldom produce more than 60% primary care graduates.

The current state of the literature does not offer a secure understanding of the factors that determine specialty choices. Although the available studies do support various aspects of the model, many of the illustrated relationships have not been studied or have not been studied with appropriate or reliable instruments. Few researchers have developed any sort of model of specialty choice, or even hypothesized how mul-

iple variables are likely to influence specialty choices. Rather, nearly all studies have looked at only one or a few of the variables likely to have impacts in isolation of the others. In all studies, more than 50% of the variance in specialty choices was left unexplained, and in the few available multivariate studies, the most powerful associations with specialty choice related to whether a school was public or private, without much explanation or theory as to why. Finally, few medical schools take an inquiry approach to the strategies they use to influence primary care career choices. Of the close to 150 U.S. allopathic and osteopathic medical schools, few appear to systematically track their admission, curriculum, governance, promotion, and funding practices with regard to specialty choice, or else fail to publish their findings.

Elsewhere we report in detail about the state of the literature and provide recommendations for further research.<sup>108</sup> However, we want to note here that there is a pressing need for explanatory research with causal designs and for critical and open discussions of alternative models of primary care specialty choice.

## RECOMMENDATIONS

If the United States needs more primary care physicians immediately, then manipulating the determinants of specialty choice and maintaining students' unlimited ability to select any specialty they wish will not rapidly meet this need. As our work group for this project noted, the goal of increasing the number of primary care physicians in this country could most quickly be met by decreasing the total number of residency positions, making 50% of the available positions primary care, and increasing the relative income of primary care physicians.

However, if the strategy is to maintain the current system and manipulate the variables thought to influence spe-

cialty decisions, a multifaceted approach should be taken to effectively address several areas simultaneously. Further, many institutions have already put the "easy" strategies in place, such as instituting required family practice clerkships. The remaining strategies, "harder" or more complex ones, if you will, will require financial and possibly legislative support from the federal government and state governments, local institutions, and/or perhaps foundations or health care delivery organizations. Also, many of those strategies will require significant local leadership as well as political clout and savvy. Our recommendations are as follows:

1. **Develop academically credible departments of family practice, general internal medicine, and general pediatrics.** Currently, these primary care departments are typically composed of many non-tenured faculty who have less influence on the culture and decisions of the medical school than tenured faculty in other disciplines. Further, primary care departments frequently use large numbers of clinical and part-time staff. While these faculty provide practical role models, having a significant proportion of the faculty in these types of appointments (non-tenured, part-time, or clinical instructors) has been found to be negatively correlated with producing a significant proportion of primary care graduates. A second reason for building the academic credibility of primary care departments—which would be done predominantly by building their research capacity—is that there is a great need for research to undergird the practice and disciplines of family practice, general internal medicine, and general pediatrics.<sup>9</sup>

2. **Systematically attend to changing medical schools' cultures to value primary care.** Medical school cultures must be changed so that the members understand the competencies and underlying content of the primary care

disciplines and value the role of primary care in the nation's health care system, in the education of medical students, and in the furtherance of medical knowledge.

3. **Change admission policies to favor students who are interested in primary care and to give weight to student characteristics likely to predict future primary care career choices.**

4. **Change the composition of admission committees to include people who have track records of successfully selecting students who will ultimately pursue primary care careers.**

5. **Use recruitment and selection processes that are most likely to attract students who will choose primary care careers.**

6. **Have volunteer and clinical primary care faculty who have received teacher training—rather than regular full-time faculty—teach first- and second-year clinical courses.** This would provide good instruction to the students while at the same time allow regular faculty to focus on other education and research activities that build academic credibility and provide exposure and influence in the medical school.

7. **Establish required longitudinal primary care experiences.** One curriculum strategy that seems most likely to influence primary care specialty choice is a longitudinal primary care course that spans a year or more (usually during years three and four) and provides students with an accurate picture of comprehensive and continuous care.

8. **Establish required third-year family practice clerkships.** Clearly, a primary care clerkship should be required in the third year. More specifically, a clerkship in family practice should be required, because this is the only primary care discipline in which the presence of a clerkship has been consistently found to correlate with specialty choice. This is not to say that general internal medicine or general pediatrics clerkships would not have a positive impact. In fact, the lack of any

ambulatory general internal medicine or general pediatrics courses in most schools means that many students have no understanding of the actual practices and lifestyles of practitioners in these specialties. However, no study has looked specifically at the impacts of such clerkships. Studies that have looked at the relationships between the presences of "primary care" or "ambulatory" clerkships and specialty choice have found no significant association, unless the clerkships were taught primarily by family physicians. It is important, however, to recall that when the presence of a primary care clerkship was studied along with other variables, it was not the clerkship that accounted for the largest amount of variance in specialty choice. Thus, we should not expect the required clerkship to solve the specialty-selection distribution problem. Nevertheless, it is likely to influence some students, and, we would argue, it is a fundamental course for all physicians regardless of their eventual specialties.

9. **Establish a course on the health care needs of society and the physicians' role.** It appears that many students who select primary care are drawn to this specialty because they see it as meeting the needs of society.

10. **Establish a career counseling program, including formal education on key characteristics of specialties.** Students view a lack of knowledge about the actual practices of various specialists as a major impediment to their career decision making.

11. **Encourage medical schools to take an inquiry approach to education, continually assessing the impacts of their programs.** We make the strongest appeal for medical schools to take an inquiry approach to education. There is a great deal of experience among the medical schools with various curriculum strategies. Unfortunately, these are seldom implemented, nor are valid data collected in such a way that their impacts can be evaluated. Medical educa-

tion is a most expensive enterprise for both the student and the taxpayer. And the health of a nation is one of its most precious resources. Given the monetary and societal costs associated with medical education, it is surprising that essentially no federal dollars and few other dollars are allocated to the continual study and furtherance of our knowledge about how to educate physicians in the most cost-effective and high-quality manner and in a way that best serves society.

**12. Request the federal government, state governments, and health care organizations to allocate significant dollars for training and research in primary care and for the careful and continual study of medical education.** This brings us to the final and pivotal recommendation. Some of the recommendations above can be implemented with few additional dollars. However, most of them require further funding.

Certainly, building academically able faculty and credible primary care departments requires significant dollars immediately and on a continuous basis. The federal government has been the primary funder of medical research. Without a commitment to primary care research similar to that given to basic science and other medical research areas, the primary care departments in U.S. medical schools will never be on par with other departments. More important, the majority of physicians in the nation (i.e., primary care doctors) will not have the benefit of a growing foundation of knowledge on which to base their practices.

We would argue that the funding for medical education research is also a federal responsibility. The quality of the health of the people and the distribution of the health care workforce are federal issues. Also, as discussed in the literature review above, individual medical schools do not have the resources or the inclination to develop the basic instruments required or to conduct the

across-school or nation-wide studies necessary to address the next questions in this area.

Similarly, states must recognize that it takes resources to change curricula and to train teachers in new content areas and in new teaching strategies. The schools will be unable, even if willing, to make major curriculum changes while their state legislatures cut teaching and research funding and their clinical faculty members are asked to generate more dollars through clinical practice, thereby providing less time to research.

In addition, health care organizations, and the state and federal legislators who regulate such organizations, must recognize that there are costs to training future physicians. If, for example, managed care organizations do not refer their patients to the medical schools' teaching facilities, and if they do not allow their physician employees to volunteer as teachers, medical schools will not survive, much less successfully undergo major changes.

In summary, significant funding from multiple sources—but primarily the federal and state governments—will be needed if medical schools are to make the changes we recommend above. Such changes are necessary to increase the number of graduates selecting primary care careers.

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#### Cover Note

#### GEORGE WASHINGTON'S DEATH



In the winter of 1799, George Washington was living the settled domestic life he had longed for during his anxious years as head of the army and his eight frustrating years as the first president of the new republic. He had left public life gratefully and joyfully two years before, returning to Mt. Vernon and beginning to repair the dilapidation of 20 years of neglect of his house and farms.

He enjoyed the rural round of overseeing the crops and farm work and eating family meals with his wife and assorted relatives. On December 12, he made a usual ride of inspection to his farms, spending five hours in snow, hail, and cold rain with the temperature hovering near freezing. By the next day he had developed a sore throat. He would not take medicine for it because he never did for slight complaints, but he took the precaution of not riding out again to the farms.

He grew increasingly hoarse during the evening, and by morning was clearly ill. His lifelong friend Dr. James Craik blistered and bled the former president, who had already been bled once before the physician's arrival. At mid-afternoon, Dr. Elisha Cullen Dick of Alexandria, Virginia, and Dr. Gustavus Richard Brown of Port Tobacco, Maryland, arrived. The doctors disagreed about whether to bleed the patient further or to open the trachea so that he could breathe better.

Washington believed from the beginning of his illness that it was mortal, and he spent his last day, between medical treatments, arranging his affairs, although he was in considerable pain and had great difficulty breathing. In the afternoon and evening, he became steadily worse, and Dr. Craik stayed in the room, grieving and overseeing his friend's final hours. (The two other doctors waited downstairs.)

Many physicians have speculated as to the cause of George Washington's death. The two most common suggestions are diphtheria and streptococcal infection of the throat, both of which were beyond any useful treatment available at the time.

In the crude, highly stylized engraving, the physician's watch is shown prominently—the watch would have been an expensive instrument and a symbol of scientific medicine.

—ADDEANE S. CAELLEIGH